

**ABSTRACT OF THE DISCLOSURE**

GaAs<sub>(1-x)</sub>Sb<sub>x</sub> layers are grown by MOCVD. For lattice matching with InP, x is set to 0.5, while beneficial alternatives include setting x to 0.23, 0.3, and 0.4. During MOVCD, TMGa (or TEGa), TMSb, and AsH<sub>3</sub> (or TBAs) are used to fabricate the GaAs<sub>(1-x)</sub>Sb<sub>x</sub> layer. Beneficially, the GaAs<sub>(1-x)</sub>Sb<sub>x</sub> layer's composition is controlled by the ratio of As to Sb. The MOCVD growth temperature is between 500 °C and 650 °C. The GaAs<sub>(1-x)</sub>Sb<sub>x</sub> layer is beneficially doped using CCl<sub>4</sub> or CBr<sub>4</sub>. A heavily doped GaAs<sub>(1-x)</sub>Sb<sub>x</sub> layer can be used to form a tunnel junction with n-doped layers of InP, AlInAs, or with lower bandgap materials such as AlInGaAs or InGaAsP. Such tunnel junctions are useful for producing long wavelength VCSELs.

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